The Monthly Review

Published by the AMERICAN ELECTRO-PLATERS' SOCIETY

JULY 1937

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The Monthly Review

Published by the AMERICAN ELECTRO-PLATERS' SOCIETY

A Society for the Advancement of the Science of Electro-Plating

JULY 1937

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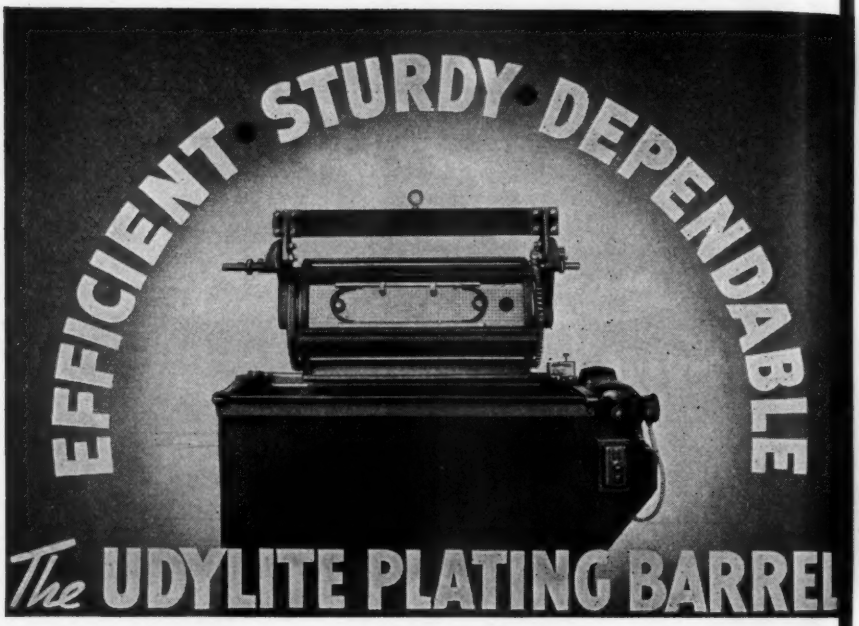
SUBSCRIPTION $3.00 A YEAR

Entered as second class matter at the Post Office at Springfield, Mass., September 8, 1930, under Act of August 24, 1912.

Acceptance for mailing at special rate of postage, provided for in section 1103. Act of February 28, 1925, authorized September 3, 1926.



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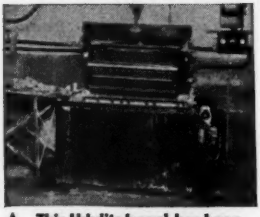

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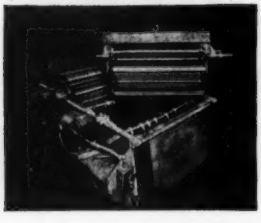

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The MONTHLY REVIEW

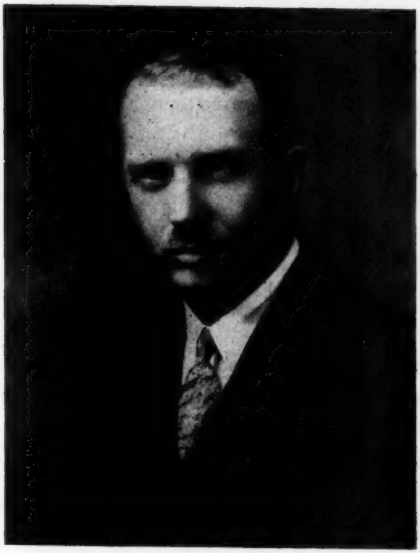
Published by the
AMERICAN ELECTRO-PLATERS' SOCIETY

Publication and Editorial Office
90 Maynard St.
Springfield, Massachusetts

VOL. XXIV JULY 1937 NO. 7

Editorial

By A. B. WILSON, President of the A. E. S.



AUSTIN B. WILSON
President, American Electro-Platers' Society

Austin B. Wilson, the new president of the American Electro-Platers' Society was born in 1895. He graduated from the Buffalo Lafayette High School in 1913 and started on his industrial career in the laboratory of the American Brass Co., Buffalo, N. Y., in the same year. In 1915 he was employed by the Titanium Alloy Mfg. Company, Niagara Falls, N. Y., in their physical laboratory, and remained there until 1923. For the last four years of this period, he had charge of their physical and metallographic laboratories. From 1923 to 1925 Mr. Wilson worked with the Trumbull Steel Co. as a metallographist and on plant experimental work.

From 1925 to 1934 Mr. Wilson was metallurgist of the Flint plant of the Chevrolet Motor Company and from 1934 to date he has been metallurgist for the Detroit plants of the Chevrolet company.

Mr. Wilson first become interested in plating in 1926. He has installed and operated most of company's plating jobs, the generator capacity of which is about 300,000 amperes. In connection with this work he installed and put into operation the first full automatic plating machine for depositing chromium on piston pins, at their Bay City plant.

Mr. Wilson has been one of the most active members in the A.E.S. in the Detroit district.

The year ending with the New York convention has been a successful one for this society. This has been due largely to the unceasing work of your retiring Executive Board, Mr. Thompson as president, Mr. Eichstaedt as membership chairman, Mr. Hanlon as educational chairman and Mr. Slattery, our past president, together with Mr. Kennedy, Executive Secretary. To these men your thanks are due as well as to the New York Branch for an excellent convention.

At this time it appears fitting to touch upon some of our aims and hopes for the future.

At the risk of encroaching upon Chairman MacStoker's domain I would like to first mention our membership drive. We want more members, both active and associate, and we certainly need them. At the New York convention I was astonished to overhear a prominent member voice the question, "Why do we want more members?" The answer is obvious. We want more members for the increased revenue that they bring. The purpose of the society is educational and although many of our speakers come from supply houses and firms who pay their expenses there are also many men equally good, unavailable to our branches because of this same matter of expenses. That is one of the prime reasons we need more members.

While on the subject of members let us mention a point that has always been controversial. That is the feeling, mostly on the part of the practical plater, that the technical man is not a friend. This it seems is due to a misunderstanding. I have never seen a plating job that could be run without a plater but on the other hand when the plater is in trouble (and they all are sooner or later) the laboratory can often be of great help. These two fellows should pull together not apart.

The matter of plating exhibits at the conventions is unsatisfactory. The exhibits themselves are of the highest quality but there aren't enough of them. Every branch should be represented and to this end you will soon hear further.

It may be that it is rather early to bring the next point up and it may also be that it does not properly come within the scope of the Supreme Society. However, it is a complaint that we constantly hear. It is the lack of papers by the practical man. Our papers of recent years have been almost entirely technical, in fact, some have been too technical. Nevertheless they have all been of value.

Certainly in this society there must be many practical men who have ideas and knowledge worth presenting. Why do they hold back? Is it because they do not feel equal to preparing a paper or facing an audience? If anyone feels thus, let him get in touch with someone of experience along this line or if he does not know such a person, let him write Mr. Kennedy who will see that a proper person contacts him. Remember this, you practical men, there are a lot of fellows who can theorize beautifully

but who if they were on your job couldn't even make the plate stick. Any man who can hold his job satisfactorily should not hesitate to present his views in a meeting as he must be pretty good.

The educational feature, the "Question Box," is another irritating spot. Why is it that in some branches it is like pulling teeth to get questions asked in the meeting when after the meeting half the members have the other half cornered asking them questions? Why not ask them in the meeting and get a general discussion started so that all may benefit? That is what we're there for.

A very important matter in our society is the REVIEW and the obtaining of advertising for it. We have laid out a program for the coming year and to carry it out we must have more advertising for the REVIEW and to get this additional advertising we must have your help. You can help greatly by seeing that advertisers and prospective advertisers know that you read the advertising matter in the REVIEW and that you give it heed. Remember that it is your REVIEW. Remember that in doing this you are helping yourself. Remember also that advertising in the REVIEW is the best form of advertising. It goes only into the hands of those interested in plating.

After reading the above give the points some thought. They are vitally connected with the welfare of our society.

PRESIDENT WILSON'S APPOINTMENTS

The following chairmen of Committees have been appointed by President Wilson. Chairman of Membership Committee, Franklyn J. MacStoker, 1st Vice-President; Chairman of Educational Committee, Ray Goodsell, 2nd Vice-President; Chairman of Exhibits, Austin Fletcher, 3rd Vice-President. The latter office is newly created and is for the purpose of stirring up more and more interest among platers and manufacturers of plated articles in presenting their products at future conventions of the A. E. S. A silver cup is presented by the Metal Industry for the Branch showing the best exhibit. Paper awards are also given to individual platers for the best work produced by them in the judgment of the awards committee.

Films *and Their Relation to* Cleaning *Before* Electroplating

BY C. JOHNSON

Read at Cleveland 1936 Convention

IN the preparation of metal surfaces for electroplating, we are to a very large extent concerned with films. The term film is here used to indicate continuous or discontinuous coatings ranging from a thickness of two millionths of an inch (5×10^{-6} centimeters)* (500A) down to coatings of molecular thickness.

Deposits of foreign matter of substantial thickness often present special problems, but whether they be oils or greases, residues of polishing compounds or oxide films, effective methods for readily removing them are available. The invisible films contiguous to the metal surface are troublesome because when they occur in actual practice facilities for identifying them are usually not available, and as a consequence, elimination of the difficulty becomes a matter of trial and error with the result that the difficulty is often overcome without definitely ascertaining the cause of it.

It is well recognized that films of various types are responsible for poor adhesion, and also that poor adhesion is due to other causes. Hothersall[1] has pointed out that poor adhesion may be due to any one of three causes, namely:

1. Weak or embrittled basis metal.
2. Defective deposits.
3. Films of foreign matter.

It is conceivable that two or all three of these causes may unfortunately occur simultaneously. With modern methods of control, however, this is not likely.

In cleaning before electroplating we encounter two general types of films. Hydrophobic or water repellant films are invisible, while hydrophilic films which are not water repellant may be visible or invisible, depending upon color, thickness and distribution.

* 2.54 centimeters = 1 inch
10^{-6} centimeter = 1 millionth centimeter
5×10^{-6} centimeter = 5 millionths centimeter = 2 millionths inch
10^{-7} centimeter = 1 ten millionth centimeter
1 Angstrom Unit (A) = 10^{-8} centimeter = 1 hundred millionth centimeter

1. Hothersall, A. W., The Adhesion of Electrodeposited Coatings on Steel. Trans. Electrochemical Society 64 (1933 76, 80)

WATER REPELLANT FILMS

A water repellant film may be only of molecular thickness of the contaminating substance and still be sufficient to prevent adherence of water and therefore, in most cases but not in all cases, the adherence of electro-deposited metal. Water breaks may be classified generally as being caused by four different types of films:

1. Films of oils or fats of mineral, vegetable or animal origin.
2. Films due to soaps or fatty acids liberated from soaps.
3. Films of finely divided solid matter.
4. Adsorbed gas films.

OIL FILMS

If the film is of the first type, from several seconds up to several minutes will be necessary for eliminating it in a hot alkaline solution. The time required will vary with different metals and oils, a mineral oil on steel usually requiring the longest time for complete removal. Animal and vegetable oils or fats emulsify more readily than mineral oils because they invariably contain small amounts of free fatty acid which are immediately neutralized by the alkaline solution to form soap, which aids in the emulsification of the neutral oil or fat. Saponification of oils and fats is a comparatively slow process, even at the boiling temperature of water, with solutions of mild alkalinity. Such films are therefore undoubtedly removed by emulsification. In this connection it is of interest to note that the presence of traces of fatty acids in mineral oils also greatly increases the rate of emulsification.

SURFACE TENSION, ADSORPTION AND EMULSIFICATION

Emulsification has become so familiar a term in explaining a principle involved in cleaning that we usually accept the term as self-explanatory. There are definite forces in action in the process which become evident when we consider the emulsification of thin films.

The surface of a liquid acts as if it were under compression. A spider can run on water. A slightly oily needle will float on the surface film. The surface where liquid is in contact with air is under tension because the molecules in the surface layer are attracted downward and sideways by other molecules of the liquid more strongly than they are attracted upward by the air. The force exerted by the film is known as surface tension. Cer-

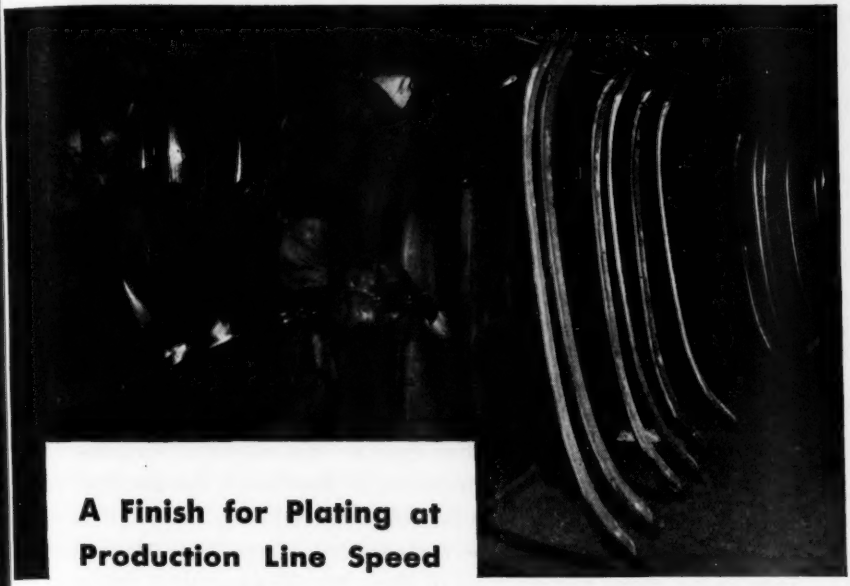
tain substances have the power of reducing surface tension; that is, weakening the film and thus increasing the wetting power of water. Soap has this property to a remarkable extent. When soap is dissolved in water it becomes more highly concentrated in the surface film than throughout the solution. The concentration at the surface proceeds until the surface tension is reduced as far as possible. The same condition will arise at the surface or interface where two liquids or a liquid and a solid meet. If, however, two liquids are miscible, the interfacial tension drops to zero.

This concentration of a substance at a surface is known as adsorption. When a soap solution and oil are both in contact with a metal surface, three different interfaces exist — oil/solution, oil/metal and solution/metal. If the oil/metal interfacial tension exceeds the sum of the other two interfacial tensions, the oil/metal interface will contract and thereby increase the solution/metal interface. As the oil/metal interfacial tension is constant at any given temperature, we can reduce it only by increasing the temperature. To reduce the area of the oil/metal interface, it is obvious that we must reduce the oil/solution and solution/metal interfacial tensions. This must be done, however, without formation of films on the metal surface, which will be objectionable. It is usually accomplished by selecting a type of soap or other surface tension depressing agent which does not cause trouble with film formation and further lowering the interfacial tensions by the use of alkalis and alkaline salts.

As the oil film on a metal surface is broken at a number of points, it is obvious that continued shrinkage will accumulate the oil from a limited area into a globule which, when it separates from the metal surface, is surrounded by an adsorbed film. Adsorption and the changes in interfacial tension due to it are therefore the important factors in the process of emulsification of oil films.

The length of a paraffin oil molecule containing a chain of 18 carbon atoms calculated by Muller[2] from X-ray diffraction observations is 2.56×10^{-7} centimeter (25.6A). The smallest globules of oil found in emulsions[3] have a diameter on the order of 10^{-5} centimeter (1000A). Therefore, if we assume the minimum thickness of an oil film is the same as the length of the molecule, the

2. Muller, Proceedings of Royal Society. A., 114, 542 (1927)
3. Clayton, Wm., The Theory of Emulsions and their Technical Treatment. P. Blakiston's Son & Co., Philadelphia (1935) p. 3



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diameter of the smallest globule in an emulsion is 40 times the thickness of the film and the oil in the globule will cover an area 27 times as great as the cross sectional area of the globule itself.

The process of emulsifying such a film must therefore consist of breaking the film at a weak point and displacing the oil film by a water film until the oil is accumulated from a sufficient area to form a globule of such size that it can be dislodged from the surface. Traces of fatty acid in a mineral oil film constitute points of attack for an alkaline solution because the fatty acid is neutralized almost instantaneously to form soap at the surface where it is adsorbed with a pronounced reduction of interfacial tension. The soap formed within the oil film helps the alkaline solution to wet the metal surface and thus displace the oil film. As a result the cleaning action is much more rapid than when the adsorption of soap must take place from the solution itself.

Because oil films are always detected by the water breaks which they cause, some peculiarities of these breaks may be of interest. When an alkaline solution of comparatively high soap content and low surface tension is employed for cleaning bright steel stock coated with mineral oil, incomplete removal of the oil film does not show up immediately as a break. The break does not appear until the rinse water film has drained sufficiently to leave a thin film of water. At times it may not show up until the rinse water has been allowed to drain for a minute or more, which is considerably longer than the average observer will allow. The thick film of rinse water apparently bridges over the oil film. This condition may be due to the presence of soap in the rinse water which reduces the surface tension to a point where it spreads readily on the oily surface. Rinsing under a tap of flowing water will remove the soap and cause the break to show up more promptly. An acid dip will destroy the soap and raise the surface tension of the water film so that it will break immediately on an oily surface.

Another type of break due to oil is occasionally found on cold rolled steel. If an oily piece of cold rolled steel is given a deep draw, the metal in some parts of the blank is severely compressed. Such a piece of metal can be cleaned until it will hold a film of water perfectly. If it is placed in an acid bath and left long enough to etch the metal, it will often show a decided break, especially on the badly strained areas, when rinsed. This type of break will not show up unless the acid is allowed to act long enough to open

up the pores of the metal, and can therefore be distinguished from other types of breaks which appear after an acid dip. Evidently a small amount of oil is sealed in when the pores of the metal are closed up by deformation during the drawing operation.

A third type of break due to oil is caused by the fact that with an efficient cleaning bath it is more difficult to remove the oil from small particles of solid matter present on a metal surface than it is to remove the oil from the metal itself. When the particles of solid matter are very small and fairly uniformly distributed as in the case with solid particles found on cold rolled steel, these particles will retain sufficient oil to create a water repellant oil film. This condition can be identified by the fact that wiping with a wet cloth will remove the solid particles without transferring the oil from them to the metal. Therefore after wiping and rinsing again the break will not reappear. This indicates conclusively that the oil film was associated with the solid impurities instead of the metal surface.

SOAP FILMS

The type of water repellant film due to soaps is well known to all electroplaters because advantage is taken of this type of film for drying off nickel plated or cadmium plated work by dipping it into a soap solution followed by rinsing.

The freshly deposited metal is unquestionably free from oil or grease, but it instantaneously adsorbs from the soap solution a film of soap of perhaps no more than molecular thickness which prevents the rinse water from adhering and as a result the work drains almost completely and is easily dried without formation of water stains. While this type of film is closely related to the oil film, it differs in that it is a film of material actually deposited from the cleaning solution.

The tendency for soap solutions to produce adsorbed soap films on metal surfaces varies with the type of soap and the kind of metal. High titre soaps are adsorbed most readily by a metal surface, even from very dilute solutions. The tendency for adsorption diminishes with the number of carbon atoms in the fatty acid and also with the degree of saturation of the fatty acid. A stearic acid soap has very pronounced film forming properties. Oleic acid soap with the same number of carbon atoms but two less hydrogen atoms is not adsorbed as readily. Linoleic acid soap (linseed oil) is less readily adsorbed than oleic acid soap, while

the highly unsaturated abietic acid (rosin) soap is not adsorbed to a sufficient extent to form a water repellant film. Polished brass for example will adsorb sufficient stearate soap film to cause a water break from a cleaning solution when the soap concentration is only 0.01%, while no break will occur with a rosin soap concentration of 3%. There appears to be a definite relationship between adsorption of soap films and cleaning. If we exclude rosin soap which does not produce a water repellant film, the soaps which are most readily adsorbed, or perhaps more correctly the soaps which produce water repellant films most readily when adsorbed, also have the best cleaning action when present in small amounts in an alkaline cleaning solution. This statement is based upon observations of their effectiveness in alkaline solutions for removing films of mineral oil from bright cold rolled steel.

Sulfonated oils such as sulfonated castor oil and sulfonated oleic acid do not produce water repellant films, but do not have the cleaning action of soaps which do. The synthetic soap substitutes, such as higher fatty alcohol sulfates and higher fatty acid amido sulfonates are adsorbed sufficiently to produce water repellant films. Wetting agents produced from aromatic hydrocarbons, if adsorbed, do not produce water repellant films.

Alkaline cleaning baths for use on polished surfaces are usually made up without a soap content, but gradually become contaminated with soap by neutralization of free fatty acids in the polishing greases and gradual saponification of the grease after it has been removed from the metal surface.

For the rapid removal of mineral oil from unpolished and cold rolled steel surfaces, a solution with low interfacial tension to oil is essential, and when only this type of stock is being cleaned it is necessary to add a soap or other interfacial tension reducing agent to the cleaning bath.

The exact nature of the water repellant film adsorbed from a soap solution is unknown. A soap solution, because of the semi-colloidal nature of soap is very complex. It contains, according to Lawrence[4]

Water	Molecularly dispersed soap
Fatty ions	Alkali ions
Neutral micellae	
Ionic micellae	

4. Lawrence, A.S.C., Soap Films. G. Bell & Sons, Ltd. London (1929) p. 116, 128

The thinnest sodium oleate film recorded by Lawrence[4] has a thickness of 6 x 10^{-7} cm. (60A), but this is a double film as there are two surfaces and a layer of solution between them. Langmuir's[5] determinations on monomolecular films on water give 1.12 x 10^{-7} cm. (11.2A) as the length of an oleic acid molecule and 2.5 x 10^{-7} cm. (25A) as the length of a stearic acid molecule. His value for stearic acid agrees very closely with Muller's values obtained by X-ray diffraction methods which are 2.44 x 10^{-7} cm. (24.4A) for stearic acid and 2.56 × 10^{-7} cm. (25.6A) for a paraffin molecule containing 18 carbon atoms. The water repellant film produced by a soap solution on a metal surface must therefore have a minimum thickness of approximately this order.

The large difference between Langmuir's values for oleic and stearic acid is of particular interest because ot a pronounced difference in the tendency for soaps from saturated and unsaturated acid to form hydrophobic soap films on metal surfaces. The fact that soap produces a water repellant film leads tc the conclusion that a soap or fatty acid molecule orients itself on a metal surface just as it does on a water surface, with the active group toward the metal surface.

The minimum thickness of a water repellant soap film on a metal surface must therefore be approximately 2.5 x 10^{-7} cm. (25A). Hydrolysis results in the formation of a fatty ion, but this is a negative ion whereas the water repellant soap film takes place at the cathode in an electric cleaning bath. To account for this fact it is necessary to assume the presence of positively charged soap molecules in the solution.

Adsorbed soap films are not produced on all metals during the cleaning operation. Brass has a greater tendency to adsorb such films than any other metal or alloy. Steel does not adsorb sufficient soap to produce a water repellant film when a solution of very high soap content is used for cleaning it. The high soap content of course makes rinsing more difficult, but after thorough rinsing no water repellant film which could be attributed to adsorbed soap has ever been found.

When polished brass is made the cathode, a water repellant film will form in a solution which does not produce a film without current. This fact provides a very simple means of distinguishing between an adsorbed soap film and a film of oil or grease. Con-

5. Langmuir, Irving, The Constitution and Fundamental Properties of Solids and Liquids. II Liquids. Journal American Chem. Society. 39, 1848-1906 (1917)

tinued application of the current does not remove a film due to soap but will remove one due to oil or grease. Furthermore if the work is made the anode for a fraction of a second, the soap film will be removed. Merely touching the rack to the anode bar for an instant, before removing it from the bath, providing there is another rack on the work rod to complete the circuit, is sufficient to remove the water repellant film due to an adsorbed soap film. Adsorbed soap films are also removed in less than a second by immersion in a mild hot alkaline solution which does not contain soap.

FATTY ACID FILMS

While soap films do not form on steel, a fatty acid film[1] may be formed when a solution of rather high soap content is used for cleaning, followed by insufficient rinsing and an acid dip. The acid decomposes the soap which has not been rinsed off, liberating the fatty acid which adheres to the steel. This condition is very apt to arise on parts handled by automatic plating units if the gauge of the metal and the temperature of the cleaning bath are such that the cleaning solution dries on all or part of the surface during the period required for transferring the work from the cleaning tank to the rinse tank. A dried on film of cleaner containing soap does not re-dissolve readily, especially in cold water and will therefore be carried into the acid bath. Fatty acid films are removed by mild hot alkaline solutions almost instantaneously, the fatty acid being converted back to soap which dissolves either in the cleaning bath itself or the rinse water. A cyanide plating bath is sufficiently alkaline to remove adsorbed soap films and fatty acid films. This we believe accounts for the fact that excellent adhesion is occasionally obtained on surfaces which show a pronounced water break.

FILMS OF FINELY DIVIDED SOLID MATTER

This type of film is due to the presence of a film of dust which is entirely free from oil. We have previously classified a film of oily dust as a special type of oil film. The complete extraction of oil and grease from a metal surface is readily accomplished by vapor phase degreasing, as the vapors condensed on the metal surface are practically pure solvent free from oil contamination.

It is characteristic of the vapor degreasing process[6] that it leaves the metal surface with a film of dust, if dust was originally present in the oil film. The larger particles of dust will be flushed

6. U. S. Patent No. 1, 961, 867

away, but microscopic particles will remain. If two pieces of metal covered by the same oil and dirt are cleaned, one by the vapor degreasing process and the other by a hot alkaline cleaning solution until the oil is completely removed from both the metal surface and the dust particles, the one which has been degreased will show a water break when rinsed and the other will not. A perfectly oil-free and thoroughly dry dust absorbs water rather slowly, apparently because each particle is protected by an air film. This is a case of gas adsorption. You have all perhaps noticed that when a drop of water falls on a very dusty surface, the drop instead of soaking into the dust immediately becomes coated temporarily with a film of dust. The water must force the air film from the dust particles before it can penetrate them, and when the particles are small enough some time is required for this to take place.

A piece of metal cleaned in an alkaline solution will have a film of dust remaining on the surface if dust was present in the oil film, but the dust particles will be wet and are protected from the air by a water film. Therefore a water break due to oil-free solid matter in finely divided form does not occur on surfaces which are cleaned in a water solution. This type of film is peculiar to a process in which the surface is exposed to air during or after the cleaning process. A somewhat similar situation can, of course, occur if surfaces that have been cleaned in a water solution are permitted to dry. Such surfaces after brief contact with the air will show a water break when rinsed in cold water.

ADSORBED GAS FILMS

Gas will be adsorbed at the metal surface as well as at the surface of finely divided particles of solid matter on the surface. It is, however, much easier to displace a gas film from a metal surface than from finely divided particles of solid matter. Exposure of a clean dust-free surface to air for some time will often result in sufficient adsorption to produce a film that is water repellant. When the surface being cleaned is made the cathode, hydrogen gas is formed at the surface and may be adsorbed, but no instance of a water repellant film being formed in this way has been observed, in spite of the fact that the adsorption may proceed to the point of embrittlement in the case of steel. Kaye[7] points out that blistering of electrodeposited metal may also result from the adsorbed gas.

7. Kaye, A. L.; Colloidal and Surface Aspects of Metal Cleaning and Finishing. 8, (1936) 9, 71

Surfaces carrying water repellant films of solid matter or adsorbed air should always be wet out by exposing them to a mild alkaline solution before plating. A cyanide plating solution is sufficiently alkaline to give the desired results in some cases. A nickel plating bath will not wet out such a surface uniformly.

When work which has been cleaned shows a water repellant film, a few simple tests can be applied to determine the nature of the film. If we assume that the film is due to insufficient cleaning, when it is actually caused by a soap film or a dried-on film of cleaning solution due to too high a temperature, increasing the concentration of the cleaning solution will not improve the condition and usually will aggravate it. Discarding the cleaning solution may temporarily correct the condition, but increases costs unnecessarily. By recognizing the fact that the breaks may be due to other causes, it becomes easier to control them and turn out all work free from the type of film which is water repellant.

FILMS WHICH ARE NOT WATER REPELLANT

Films which are not water repellant also prevent perfect bonding of the plate to the basis metal. Some of these are visible films, and these, of course, are easily recognized and removed by proper treatment. Others, like films which cause water breaks, are invisible and, therefore, can be identified only by the methods which will eliminate them.

It is rarely, if ever, possible to accumulate enough of the substances of which such invisible films are composed for chemical analysis and there is, therefore, certain to be a difference in opinion as to their nature and composition. The presence of invisible films which do not cause a water break is usually detected only when the plate strips. It is well recognized that all cases of stripping are not due to improper cleaning. When the plating bath is in proper condition, however, the cause must be looked for elsewhere. We do not hesitate to state that every electroplater has, at some time or other in his career, run into an epidemic of stripping. When stripping starts, a general check-up on all operations is usually made in an effort to eliminate the trouble as quickly as possible so that it is not always possible to definitely decide which of several possible causes was the actual cause for the condition. Practically all of the troubles in cleaning before electroplating lie in the removal of the film of

foreign matter that is in actual contact with the metal surface. The heavy accumulations of oil, grease, dirt and abrasives which overlie the film itself are usually removed without difficulty.

It is, therefore, felt that a better understanding of the nature of the films, which do not cause a water break, will also be of value in correcting the difficulties which they cause.

WATER WETTABLE FILMS

The films which do not cause water breaks may, for convenience, be classified as follows:

I. *Visible Films*
   1. Films integral with the metal
      a. Present on the stock before cleaning
      b. Formed during the cleaning operation
   2. Films consisting of small particles of solid matter
      a. Present on stock before cleaning
      b. Formed during cleaning operation

II. *Invisible Films*
   1. Passive surfaces
   2. Films formed by cleaners or contaminations of cleaners

FILMS INTEGRAL WITH THE METAL

The visible films are visible because they are different in color from the basis metal. Films integral with the metal are films produced by oxidation or other chemical changes of the metal surface, either during the manufacture of the stock itself or at some stage of the manufacturing operations, up to and including the cleaning operations. These films often will have brilliant colors such as a bright blue heat scale on steel or a brown to purple tarnish on brass.

If, for example, one end of a piece of steel is heated in a flame, an oxide scale will be formed, the thickness of which is greatest nearest the flame. Somewhere along the piece the thickness of the oxide film will be less than the wave length of light and in that region several bands of different colors ranging from blue to yellow are produced which are usually called temper colors. These are not the true colors of the film but, like the colors of soap bubbles or films of oil on water, they are due to the interference of light waves of different wave lengths when reflected from the inner and outer surfaces of the thin films. The blue color is due to a film thickness which causes interference of the long yellow light waves, and the blue color is therefore nearest

the heated end. Beyond the blue color the thinner film causes interference of shorter green light waves and the color appears purple, while further along the film is still thinner and therefore neutralizes the short blue light waves and gives a straw yellow color. Evans[8] has shown that beyond the yellow color there is an oxide film which is so thin that it does not cause interference of visible light waves and is, therefore, invisible. A second but less distinct series of such interference colors can sometimes be found nearer the heated end of the piece of steel which are due to an oxide film which is thicker but still transparent enough to set up light interference.

These very thin oxide films present no special problem as they are removed very quickly by an acid dip. Candee[9] has observed that there is considerable difference in the action of acids on oxide films on steel, hydrochloric acid being the most effective.

The thickness of these oxide films has been measured by Constable[10] and found to be approximately two millionths of an inch (5×10^{-6} centimeter, 500A). The sheet of paper on which this is written is about 1400 times as thick. A film thinner than 1.6 millionths of an inch (4×10^{-6} centimeter, 400A) does not cause interference of visible light waves and is, therefore, invisible if it does not have a color which is different from that of the basis metal. The most common case of a film approaching this thickness produced in the cleaning operation is heavy tarnish on brass. This is usually caused by permitting an oxidizing condition to exist in the cleaning solution. It is peculiar that different alkalis and alkaline salts vary greatly in their tendency to stimulate the formation of such oxide films. For example, a solution of a strong alkali like caustic soda has less tendency to tarnish than a solution of a mildly alkaline material such as tri-sodium phosphate.

A freshly made up cleaning solution will often produce a heavy tarnish on brass due to oxygen which is in solution in the water. Boiling expels the oxygen and stops the tarnishing. We are here, of course, speaking of the tarnish which develops while the parts are immersed in the solution and not tarnish which forms when the hot metal parts are exposed to the air long enough for the cleaning solution to partially dry.

8. Evans, V. R., The Passivity of Metals. Part I. The Isolation of the Protective Film. Journal Chemical Society (1927) 1024
9. Candee, E. T., The Effect of Various Acids on Cold Rolled Steel. Monthly Review A.E.S 22 (Aug. 1935) 23-37
10. Constable, F. H., Spectrophotometric Observations on the Growth of Oxide Films on Iron, Nickel and Copper. Proc. Royal Society of London (1928) Ser. A. 117, 376

An interesting case of localized tarnishing of brass was found to be due to the oxygen produced at the anode when current is used for cleaning. In this case the tank itself was used as the anode and due to poor circulation of the cleaning solution in the tank, the temperature of the solution near the bottom was only 115°F., when the temperature at the surface was 135°F. The pieces at the bottom of the rack tarnished while those higher up did not, in spite of the fact that they were in the low temperature solution during the greater part of the time they were in the cleaner. As soon as the temperature of the solution was raised to 135°F. throughout the solution, the tarnishing stopped. It was, therefore, concluded that the current was flowing between the bottom of the tank and the lower pieces on the rack, thus releasing oxygen bubbles directly underneath these parts into a solution which was cool enough for the oxygen to dissolve in it. The large temperature difference was found to be due to the fact that the steam entered the top pipes of the coil and apparently was practically all condensed before it reached the bottom pipes, thus setting up circulation principally of the solution in the upper part of the tank.

The prevention of formation of integral films by the cleaner is important because when such films are removed from a highly polished surface the luster is considerably reduced. Such integral films are not usually experienced on steel but will form under certain conditions. Contamination of an alkaline cleaning solution with sulphur from a sulphur base oil or with free sulfur occasionally used in a drawing lubricant will produce sulphide films on steel as well as brass. These films do have a color but it is quite different from the blue, purple or brown color which is apparent to the eye. From what has been already stated, it is evident that an oxide film must reach a certain thickness before it can cause light interference. Those which are so thin that they are not visible can be detected by chemical tests and when present the metal surface is said to be "passive."

FILMS OF SMALL PARTICLES

Films consisting of small particles of solid matter may consist of solid matter present on the stock before cleaning. Such films are held in place by oil or grease, but the smaller particles are so minute that even after the oil has been removed they will not rinse off. This is believed to be due to a molecular attraction

which must be very high, because the most powerful blast of air or a stream of water under very high pressure will not dislodge the particles. The film which is often found on cold rolled steel is typical of this type of deposit. These particles can be wiped off very easily. As yet only one effective method, other than wiping or brushing, has been discovered, by means of which these particles can be washed off with water without chemical action on the metal surface itself. In this process[11] molecular forces are employed in overcoming the adhesion of the particles to the metal. The metal is exposed by immersion or spraying to a solvent of the type which emulsifies spontaneously in water. The particles of dirt adsorb a coating of the emulsifying agent from the solvent and when water is applied, preferably by sprays, the coated particles become temporarily wetted by the water at the same time that the solvent itself is broken up by sudden changes of surface and interfacial tension into minute particles to form an emulsion. The peculiar part about this process is that the film of oil next to the metal is not displaced while the solid particles are being surrounded by a film of water. As a result the water wet dirt particles and the oil wet metal become mutually repellant and the film can therefore be washed off with water. If the particles of solid matter are dry or wet with water instead of being wet with oil, this process is not effective. Therefore it will not remove insoluble residues of the type produced on steel by pickling or the black film produced on aluminum alloy by the action of an alkaline solution. The removal of particles of solid matter is important because these particles when very small are bridged over by the plate and provide points of poor protection due to thinner plate and also points at which corrosion may start. Also, when the particles are not uniformly distributed they cause a streaked condition or even finger prints to show up in the deposit. Their removal without wiping or brushing is of course important where large production is involved.

Films of small particles are sometimes deposited out of the cleaning solution when electric current is used for cleaning. These films are due to particles approaching colloidal dimensions which are electrically charged when in suspension in the cleaning solution. They are seldom encountered in regular production but sometimes will become visible when a piece of work is left

11. U. S. Patent No. 2,032,174

in an old solution for a period considerably longer than is required for cleaning or when high voltage is used on an electric cleaner. The particles must be extremely small, as the electrical charge which they carry is not large enough to pull a particle of much over colloidal dimensions to the cathode. The films can be easily wiped off and will also be removed by reversing the current. This type of film is of interest because it is logical to assume that in its early stages it will be invisible, but still of sufficient thickness to have some effect on the adherence of the deposit. It is, of course, possible also to have metallic contamination of a cleaning solution to a sufficient extent to plate out adherent metal deposits. The metals which can be deposited from alkaline solutions which do not contain cyanide are tin and zinc. Cyanide contamination may, of course, result in an adherent deposit of metallic copper, zinc or cadmium if these metals are present.

INVISIBLE FILMS

The invisible films, which water will wet and which are present on the stock before cleaning, are usually oxide films. As previously stated, steel will carry an oxide film so thin that it is invisible. Aluminum and its alloys also carry oxide films which, however, are destroyed by alkaline solutions but reform very quickly on exposure to the air. Because these invisible films are effectively removed by acid or alkaline solutions, they do not create any difficulties.

In addition to the above, there are invisible films which are formed by the cleaning solution itself, due to chemical actions. Typical of these is the film formed by a cleaner which is inhibited to retard the attack on soft metals such as tin, zinc and aluminum, or their alloys. Sodium silicate is usually used for this purpose. When the pH of the solution is low enough and the silicate content high enough, there will be a slight solvent action on the metal and the dissolved metal will be converted into a film of the metal silicate which is invisible. If the pH is too high, this film is broken down and more metal dissolved and converted into metal silicate until a heavy white deposit is built up, especially in the case of aluminum. In the case of brass, the metal is not attacked to any noticeable extent by the alkali, but a similar film forms, only however when the alkalinity is so low that the silicate is somewhat less alkaline than metasilicate. It may be a coincidence that in solutions less alkaline than metasilicate, the silicate

is present in colloidal form while in metasilicate and the more alkaline ortho silicate, the colloidal condition is absent. It is desirable when silicates are used in cleaning before plating that there should be a sufficient reserve of alkali to maintain a ratio of alkali to silicate which is higher than that found in metasilicate. None of the other alkaline salts used in cleaning pass into a colloidal state when the alkalinity is reduced and therefore can be used at lower pH values without danger of film formation due to adsorption. It has been found that a piece of brass cleaned in silicate solution which is less alkaline than metasilicate will not take an adherent plate if the usual acid or cyanide dips are used. If, however, the cyanide dip is made more alkaline with caustic soda it will remove the film. Hydrofluoric acid is also effective for removing silicate films and is especially useful for this purpose on die castings when they are cleaned in silicate solutions. We do not wish to infer that the use of silicate is in any way objectionable because silicates do possess valuable properties in cleaning which other alkaline materials do not have. In order to make use of these properties without running into difficulties it is, however, very necessary to maintain a proper alkaline balance in order to avoid the formation of colloidal silicate films. The consumption of alkali during the use of the solution will otherwise very soon result in a condition where further additions of the cleaner will not restore the proper alkaline balance. The only remedy is to dump the solution or to restore the balance by addition of free alkali alone in the form of caustic soda.

Another type of invisible film formed in a cleaning solution is due to chromic acid or its salts. A small amount of sodium chromate in an alkaline solution has a very pronounced protective action on tin and zinc. The chromate serves either as an oxidizing agent to produce an oxide film or perhaps forms a chromate film so thin that it is invisible. The use of chromates to create what is called a passive condition on iron or steel in contact with water so as to retard corrosion is fairly well known. Chromates are frequently added to water in water circulating systems to retard formation of rust. Most electroplaters are familiar with the fact that the thickness of a nickel deposit on a test piece of brass can be checked merely by dipping the piece in chromic acid or chromate solution and rinsing before plating to make the nickel deposit peel off readily so that its thickness can be measured with a

micrometer. Brass is very sensitive to chromate contamination. One ounce of chromic acid in 1500 gallons of cleaning solution (5 milligrams per liter) is sufficient to develop a film which will cause the nickel to strip from brass cleaned in the solution. Steel will stand much higher chromate contamination before difficulty is encountered. No effective method for counteracting this type of film without affecting the polished surface has been discovered.

When the defects are not in the underlying nickel, it is sometimes the practice to strip chromium plate in an electric cleaner as this does not attack the nickel. Such a cleaning solution seems to continue to give satisfactory results when cleaning steel, but is very apt to cause trouble on brass. Where stripping of chromium in this way is practiced, it is far better to transfer the used cleaning solution, that would ordinarily be dumped, into a separate tank to be used only for stripping.

In addition to films formed during the cleaning operation, very small contaminations of the plating solution itself will result in films that prevent adhesion. Macnaughton and Hammond found that 50 milligrams per liter (1 oz./150 gal.) of chromic acid in a nickel solution was sufficient to completely prevent deposition. Jacquet found that a one second immersion in a 30 milligram per liter (1 oz./250 gal.) solution of serum albumin was sufficient to prevent adherence of copper and also cites results by Ballay indicating that the same concentration of gelatin in a nickel solution will prevent adhesion.

This paper does not pretend to be a complete survey of films in their relation to electroplating. Since its preparation, the first part of an abstract by Mr. W. R. Meyer on "The Role of Films in the Electrodeposition of Metals," covering 75 references, has been published. It is obvious that while this is a subject on which much research work has been done, a much greater amount remains to be done. If this general outline of the subject will stimulate closer observation of difficulties as they occur in actual practice, and also bring out contradictory as well as confirmatory experiences, it will have accomplished its purpose of making us all more "film conscious."

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12. U. S. Patent No. 1,734,706
13. Macnaughton, D. J., and Hammond, R.A.F., The Influence of Small Amounts of Chromic Acid and of Chromium Sulfate on the Electrodeposition of Nickel. Trans. Faraday Soc. 26 Pt. 8, 481-90
14. Jacquet, P. A., Adhesion of Electrolytic Copper Deposits. Trans. of Electrochemical Society (1934) 66, 393
15. Meyer, W. R., The Role of Films in the Electrodeposition of Metals. I. Metals and Alloys, 7, 123

ANNUAL STATEMENT
AMERICAN ELECTRO-PLATERS' SOCIETY
Year ending May 31, 1937

RECEIPTS:

Transfer of Funds from Erie	$1929.67
Gift from Cleveland Branch	1000.00
Sale of Advertising in Review	5140.82
Per Capita Tax	2871.80
Sale of Convention Proceedings	906.87
Sale of Supplies to Branches	120.37
Sale of Reviews	47.00
Expense Check from Detroit	20.00
Refund from Cleveland Convention Committee	6.00
Sale of Specifications	4.00
Total	$12046.53

EXPENDITURES:

Printing and Mailing Review	$4361.92
Printing Supplies	193.19
Officers' Mileage	84.62
Executive Secretary's Mileage	285.00
Executive Secretary: Salary	1702.80
Executive Secretary's Office Expenses	284.54
President Thompson's Office Expenses	39.41
Office Expenses: Mr. Sheehan	11.52
Office Expenses: Mr. Eichstaedt	50.33
Office Expenses: Mr. Hanlon	15.55
Office Expenses: Mr. Slattery	18.60
Printing Stationery and Supplies	57.56
Insurance, Bonding, Etc.	51.30
Typing Services	60.00
Printing and Mailing Convention Proceedings	1048.10
Subscription to German Publications	12.94
Social Security Tax	14.40
Mimeographing Reports	5.00
Returned Conv. Proceedings: Mr. Eichstaedt	5.55
Springfield Branch	5.00
Gold Medals	22.00
Flowers for Mr. Sheehan's Funeral	10.80
Exchange on Foreign Bank Checks	.72
Total	$8340.85
Bank Balance, May 31, 1937	$3874.10

Check for $168.42 on Executive Secretary's Office Expenses not yet cashed.

Recapitulation

Total Receipts for year ending May 31, 1937	$12046.53
Total Expenses for year ending May 31, 1937	8340.85
Balance as reported by Third National Bank of Springfield, Massachusetts, May 31, 1937	$3874.10
Due from Branches	10.90
Due from Advertisers	337.50
Net Worth, June 1, 1937	$4262.50

*Check No. 102, $168.42 not yet cashed.

AMERICAN ELECTRO-PLATERS' SOCIETY
ACCOUNTS RECEIVABLE FROM THE BRANCHES AND AMOUNTS PAID
June 1, 1936 to May 31, 1937

BRANCH	Paid June	Per Capita Tax	Convention Reports and Supplies	Cash Received	Balance Due
Anderson		75.09	8.25	83.34	
Baltimore-Washington		128.10	9.75	137.85	
Binghamton-Elmira		38.49	10.25	48.74	
Boston		150.68	14.35	165.03	
Bridgeport		141.23	10.75	151.98	
Chicago		363.82	12.75	376.57	
Cincinnati		32.03	6.75	38.78	
Cleveland		79.81	10.25	90.06	
Dayton		80.96	8.25	89.21	
Detroit		230.48	19.25	249.73	
Grand Rapids		44.11	6.75	50.86	
Hartford		54.61	8.25	62.86	
Los Angeles		96.94	8.25	105.19	
Milwaukee		115.50	12.75	128.25	
Montreal		60.05	6.75	66.80	
Newark		153.93	12.84	166.77	
New York		163.70	9.75	173.45	
New Haven		15.75	7.50	23.25	
Philadelphia		224.18	11.25	235.43	
Pittsburgh		49.36	8.25	57.61	
Providence	25.07	47.79	6.75	54.54	
Rochester		108.42	9.75	118.17	
San Francisco		22.70	7.75	30.45	10.90
Springfield	8.40	47.29	8.90	56.19	
St. Louis		60.90	8.25	69.15	
Toledo		50.92	7.50	58.42	
Toronto		108.16	5.25	113.41	
Waterbury		93.45	12.12	105.57	
Totals	$33.47	$2838.45	$269.21	$3107.66	$10.90

AMERICAN ELECTRO-PLATERS' SOCIETY
REPORT OF MEMBERSHIP TURNOVER
FOR THE YEAR ENDING MAY 31st, 1937

BRANCH	Members May 31, 1936	Elected	Re-instated	Gain by Transfer	Loss by Transfer	Suspended	Resigned	Died	Total for May 31, 1937	Net Gain	Per Cent Gain
Anderson	35	2	0	0	0	0	0	0	37	2	5%
Baltimore-Washington	59	5	0	0	0	0	0	0	64	5	8%
Binghamton-Elmira	14	4	3	1	0	0	0	0	22	8	37%
Boston	63	23	0	1	1	6	0	0	80	17	27%
Bridgeport	69	7	1	0	30	0	0	0	47	-21	32% loss**
Chicago	168	12	1	0	1	2	1	1	176	8	5%
Cincinnati	16	0	1	0	0	2	0	0	15	-1	6% loss
Cleveland	34	9	0	0	1	0	0	0	42	8	24%
Dayton	36	12	0	0	0	0	0	0	48	12	33%
Detroit	100	33	0	5	0	11	0	1	126	26	26%
Grand Rapids	18	5	0	0	0	0	0	0	23	5	28%
Hartford	23	14	0	0	0	3	0	0	34	11	48%
Los Angeles	50	3	1	0	0	2	3	1	48	-2	4% loss
Milwaukee	58	10	0	1	0	5	0	2	62	4	7%
Montreal	11	3	0	0	0	0	1	0	13	2	18%
Newark	64	15	5	1	2	3	0	1	79	15	23%
New Haven	30	18	0	0	0	0	0	0	48	18	60%
New York	71	19	1	1	0	0	0	0	92	21	30%
Philadelphia	102	8	0	0	0	0	0	0	110	8	8%
Pittsburgh	22	8	0	0	0	1	1	1	27	5	23%
Providence	23	0	0	1	0	0	0	0	24	1	4%
San Francisco	16	1	0	0	0	0	0	0	17	1	6%
Rochester	49	6	0	0	0	0	0	0	55	6	12%
Springfield	17	16	0	0	0	0	0	0	33	16	94%
St. Louis	26	10	4	0	0	2	0	0	38	12	46%
Toledo	22	9	1	0	0	2	0	1	29	7	32%
Toronto	48	8	0	0	0	0	0	0	56	8	17%
Waterbury	42	8	0	0	2	0	0	0	48	6	14%
Totals	1286	268	18	11	37	38	6	8	1493	207	16%

** Transfer of 30 members to newly formed New Haven Branch.

The Silver Jubilee Convention

On Sunday, June 13, the Pennsylvania Hotel, New York, began to receive the members and friends of the A. E. S. who were starting to assemble for the four day session of the Silver Jubilee Convention. Every day representatives from the different branches were being greeted, old acquaintances were renewed, and many new friendships formed. From the time Chairman Franklyn J. MacStoker with a few well chosen words of greeting turned the meeting over to President E. Steen Thompson, who presided at the first business session on Monday morning, until Thursday night, there was not an idle moment, thanks to the untiring efforts of the New York committee, who had to work out the educational and social functions of the convention program.

The Founder of the society, Mr. C. H. Proctor was present and gave the opening address. Mr. Proctor's talk was not only a greeting to the members of the A. E. S. but a plea to hold fast to the things we have achieved, to reach out for further worthwhile objectives "and to keep our heads" in these days of swiftly changing conditions. At the close of his address he was given a splendid ovation by the delegates and members present. The first President of the A. E. S., Mr. G. B. Hogaboom had the honor of presiding at the first educational session on Monday afternoon. This period was devoted to the work done at the Bureau of Standards at which time Dr. Blum, Mr. Strausser, Mr. H. Vincent Davies, and Mr. Brenner took part, the latter demonstrating the new magnetic method for measuring the thickness of nickel plated coatings on non-ferrous metals.

On Monday night the International Fellowship Club held open house. This is an event looked forward to with pleasurable anticipation each year. With plenty to eat and drink and the good fellowship that goes with it, each succeeding year testifies to the success of the club's endeavors. A brass band provided by Newark Branch with Past President Horace Smith as master of ceremonies, furnished music and entertainment. This was a novel feature this year that was well received.

The educational sessions each day were well attended. The subjects presented were extremely helpful and full of interest as the discussions after each paper was read, will show. Walter R. Meyer's paper, "Electroplating in Europe" and his account of the first International electrodeposition conference was one of the high lights of the Tuesday evening session. The pictures shown of electroplating in Europe were extremely interesting and showed the progress being made in other countries as well as our own in trying to increase production and lower plating costs by automatic equipment. The papers presented by the branches show that a lot of time and work was spent in their preparation, our society is well pleased at the contribution made by the authors of these articles and we hereby congratulate them for their splendid efforts.

The following outstanding features of the convention will no doubt be of interest to our readers who were not fortunate enough to attend the convention.

The Herminie Dorothea Proctor Award was given to George B. Hogaboom for his paper, the pH of Alkaline Solutions. The presentation of this paper and the lively discussion that followed made it the out-standing one read at any of the educational sessions. The prize award committee had little difficulty in coming to a decision as to who should receive the award which carried with it Mr. Proctor's personal check for one hundred dollars.

The Detroit Branch carried away everything that wasn't nailed down including the presidency, the Metal Industry Cup for the best exhibits and the Founder's Gold Medal.

Dan Wittig who was unable to attend the Cleveland Convention last year on account of sickness was very much in evidence whooping it up for Milwaukee. With Ray Goodsell and Bob Steurnagel they took next year's convention home with them.

The Chicago proposed amendment to the constitution relative to increased representation for the larger branches, and the Boston proposal, to be more liberal in our membership requirements were both defeated. Every one was surprised at the close vote on the Boston Branch proposed amendment, which shows that this issue is staring us in the face and will have to be recognized sooner or later. The tie vote this year means that some definite agreement should be reached regarding our membership requirements that will be acceptable to all before next year's convention at Milwaukee.

The Gold Medals were awarded as follows. The A. E. S. medal to H. P. Coats, Akron, Ohio, for his paper on Brass Plating for Rubber Adhersion, presented at the Cleveland Convention in 1936.

The Founder's Gold Medal to A. G. Spencer, Detroit Branch, for his paper on Nickel Anodes. This paper was also read at the Cleveland Convention.

Paper awards for the best exhibits were given to:

Nelson F. Sievering	Newark Branch	1st Prize
Joseph P. Sexton	New Haven Branch	2nd Prize
John H. Feeley	Montreal Branch	3rd Prize

There were so many exhibits and such a varied assortment of finishes that the committee had several bad headaches trying to figure out the winners.

A beautiful display of finishes by the International Casket Hardware Company of Thompsonville, Conn., representing Springfield Branch, an immense chrome plated cylinder from Newark Branch, and the beautiful master clock, secondary clock and a doorlock recorder in full operation from the International Business Machines Corporation were features of the exhibits that caused plenty of favorable comment. It was the nicest display of plated finishes we have seen at any convention thus far.

Bob Leather's art gallery recalling memories of bygone days were a great attraction. Bob put a lot of work into this collection. The idea was conceived at the Philadelphia annual meeting where Phil Uhl displayed several old photos that brought back happy recollections of past conventions. They also demonstrated that time is no respector of persons as we saw ourselves then—and now.

The Hanson & Van Winkle Official News was published each day and kept the delegates well informed of the convention doings. Mr. Yerger and his staff of reporters did a fine job in presenting this bulletin each morning before breakfast. The short story prizes created considerable enthusiasm. The publication of the convention news, and the cash prizes awarded were all donated by the Hanson & Van Winkle Munning Company.

Newark Branch will be the host at the 1939 Convention which will be held at Asbury Park, and will be international in its scope. Plans are already being made to make the 1939 meeting the best ever held.

Boston showed a fine spirit in withdrawing in favor of Milwaukee. When the event comes to the "Hub of the Universe" it will be equal to if not better than anything ever seen before. Boston will spare neither time nor money in endeavoring to outdo all others. That's the spirit of the Boston Branch.

Much sympathy was expressed for Hedley J. Richards of St. Louis Branch, who recently met with an automobile accident. Telegrams were sent to Mr. Richards and Mr. Fraine by the resolutions committee, expressing the feeling of the delegates and hoping for their speedy recovery.

The new officers:

President, A. B. Wilson of Detroit Branch; 1st Vice-President, Franklyn J. MacStoker, New York Branch; 2nd Vice-President, Ray Goodsell, Milwaukee Branch; 3rd Vice-President, Austin Fletcher, Binghamton-Elmira Branch.

The officers for the ensuing year were installed by the Founder of the A. E. S., Mr. C. H. Proctor. The gavel was given to the new President by the retiring President, E. Steen Thompson. Mr. Wilson declared the final session of the convention ended.

The banquet was a great success; there were over 800 in attendance. Everyone had a good time enjoying the orchestra, the entertainment, and the eats.

REGISTRATION

The total registration was	565
Open house (Monday night)	790
Banquet	810

PERSONAL ITEMS

We missed Past President Walter Fraine who is recovering from a severe illness.

Past President John Feeley was with us and won one of the exhibit prizes. Glad to see you John.

A. P. Munning sent his best wishes in a cablegram from Killarney, Ireland.

Past President E. J. Musick of St. Louis also wired his best regards. Ed has done a fine job in his branch during the past year.

Clarence A. Van Dereau, Production Manager of the Westinghouse Company's plant, Mansfield, Ohio, was there on Thursday. "Van" never loses interest in the A. E. S. Mr. Van Derau was president of the A. E. S. in 1933-34.

Fifteen out of the twenty-one past presidents were in attendance including the retiring president, E. Steen Thompson.

Chicago Branch is to be complimented on the fine representation from the Windy City. Past Presidents F. J. Hanlon, Oscar E. Servis, and H. A. Gilbertson were very much in evidence.

The ladies had a wonderful time, thanks to the program prepared by Mrs. Louis Cates and her committee.

Our sincere thanks to every member of the New York Convention Committee under the direction of Mr. Franklyn J. MacStoker for the success of the 1937 convention. Each detail was well taken care of and showed careful planning and loyal cooperation.

The Pennsylvania Hotel management also shares our appreciation for courteous service and their desire to make everyone feel at home during our stay. The air conditioned ball room where the meetings were held called for much favorable comment as did the other features which helped to eliminate noise and confusion during the educational sessions. And now lets give the new President, Red Wilson, and the officers of the Executive Board our hearty support until we meet in Milwaukee in 1938.

Mr. Hogaboom's Letter of Appreciation

To have the honor of being the first to receive the Herminie Dorothea Proctor Award is more deeply appreciated than any words can express. This honor was made greater by the presentation of the award by Mr. Charles H. Proctor to whom I, and all platers are indebted for his conception and establishment of an educational society for electroplaters — the A.E.S.

G. B. HOGABOOM

It is interesting to note that Mr. Hogaboom was the first Librarian, N.E.P.A. — the first A.E.S. president — the first A.E.S. president to be made an Honorary member of the A.E.S. National Society — recipient of the first gold medal, The National Electro Platers Society of the A.E.S. Founders Gold Medal — twice, first awards for exhibits and the first to receive the Herminie Dorothea Proctor Award for the best paper read at the Convention.

LETTER OF APPRECIATION

Dear Mr. Kennedy:

Mr. Lyons has presented me with the Gold Medal of the A. E. S. I am very much surprised, and also very happy over it. Will you please express my deep appreciation to the Society for this?

It means very much to me to be selected for such an honor by such a group of very able men. I am certain that I am also expressing the feelings of Mr. O'Neil and Mr. Friedl, who share this honor with me.

Yours very respectfully,

THE FIRESTONE STEEL PRODUCTS COMPANY

HARRY P. COATS, *Laboratory*

RUBBER GLOVES, APRONS, BOOTS ADDED TO UDYLITE PLATING LINE

Based in surveys which indicated that rubber plating accessories are rejected because of an inability to withstand wear and tear, rather than chemical corrosion, the Udylite Company of Detroit have recently introduced a complete line of rubber gloves, aprons and boots, pre-tested not only for high acid resistance, but for unusual mechanical strain and wear.

Udylite Rubber Gloves are furnished in two types RED LATEX, which is described as an ideal inexpensive glove and the SPECIAL WHITE acid resistant glove.

The RED LATEX glove wears and resists acids well. This glove is reversible and may be used on either right or left hand. It is furnished in standard wrist sizes from 8 to 11.

The SPECIAL WHITE acid resistant glove is the best quality glove handled and aside from being highly resistant to acids and corrosive liquids, it is reinforced at all wearing points for extra long life. Furnished in two lengths—half and full elbow gauntlet type and in one standard wrist size, No. 11.

The line of rubber boots is offered in a three price range. The No. 1 quality boot is an all-white boot with special acid resistant qualities. Furnished in knee-length only. The No. 2 quality boot is a red boot with white sole. Furnished in knee length only. The No. 3 quality boot is an all-black boot with red sole. Furnished in knee, three quarter and full hip lengths. All boots are furnished in foot sizes from 7 to 12—no half sizes.

Udylite Rubber Aprons are full size (32″ wide x 45″ long, excepting straps), made of one ply highly acid resistant durable rubber. Corners are reinforced with eyelets. All edges are turned in and reinforced with extra ply rubber. The HEAVY weight apron runs 3 lbs. minimum per apron. The LIGHT weight apron varies between 2 lbs. minimum and 2½ lbs. maximum per apron.

A NEW METHOD OF DETERMINING pH

The Lea Mfg. Co., Waterbury, Conn. have placed upon the market a new method for the determination of pH by the use of pH papers, which permit visual quantitative determination of the acid or alkaline content of solutions. They are as fast as the well-known Litmus papers and give accurate quantitative results at a glance. Several ranges, as follows, are available:

1	5.2 to 6.7	2	3.6 to 5.0
3	3.7 to 5.3	4	1.2 to 3.4
5	0.9 to 1.5	6	9.5 to 11.0
7	11.0 to 13.5		

These papers are very handy not only in the laboratory but out in the plant where control of acidity or alkalinity in production must be maintained. Price $7.50 per box of 200 strips.

NOTICE

The Abbott Ball Co. of Hartford, Conn. offer to help solve your burnishing problems without obligation. Just put the problem up to their experimental department. Their free sample kit is yours for the asking.

KLINKENSTEIN DISCUSSES SPOTTING OUT AT ELECTRO-PLATERS' CONVENTION

"Spotting out," a defect that often appears on plated or oxidized metal products, was discussed by Gustave Klinkenstein, of Maas & Waldstein Company, makers of industrial finishes, at the annual convention of the American Electro-Platers' Society held in New York in June.

Mr. Klinkenstein pointed out that there are two kinds of "spotting out." The first of these, called "crystal spotting," occurs only on "oxidized" products; that is to say, products of brass, copper, silver, nickel, and other metals (either solid or plated) with the surface darkened by treatment with sulphide solutions. The other kind of spotting is called "stain spotting," and this trouble occurs chiefly on plated products.

CRYSTAL SPOTTING

Crystal spots form on oxidized products after they have been lacquered. They are usually small, dark in color, and obviously crystalline when viewed under a lens. They are due, said Mr. Klinkenstein, to the action of sulphur on the metallic sulphide coating of the product. This sulphur may come from furnace gases in the atmosphere, from the wrappings of the products, and other sources. Crystal spotting is minimized by using sulphur-free wrappings and by protecting the products from atmospheric sulphur by using lacquers specially developed for this purpose.

STAIN SPOTTING

Stain spotting is caused by traces of salts from the plating bath (chiefly the cyanides), which remain in the pores of the metal coating, according to Mr. Klinkenstein. These residual salts can not be completely removed by rinsing, and, unless their action is neutralized in some way, they will absorb moisture, overflow the pores, and form blotches on the surface of the product.

To reduce stain spotting, Mr. Klinkenstein recommended the following precautions: (a) use compact base metal; (b) keep free cyanide in bath low; (c) thorough rinsing; (d) allow products to stand over night in humid atmosphere after plating and remove stains next day; (e) bake products at 250°F., which inactivates the salts; (f) use "non-stain-spot" lacquers.

Mr. Klinkenstein outlined two complete plating and finishing schedules which, he stated, effectively eliminated stain spotting. In one of these, water-dip lacquer was applied after baking; in the other, a special clear lacquer was applied without baking. Water-dip lacquer, he pointed out, may be used either as a final finish or as the foundation for a better finish. In the latter event, the products are protected from spotting by the water-dip lacquer until the final finish is applied.

CHIP PROOF COLORED FLEXIBLE LACQUER ENAMEL

A product summary giving the properties of this cellulose type, air-drying, flexible lacquer enamel. Available in all colors—standard or special match. Does not chip, flake or peel; stands blanking and forming. Samples on brass,

aluminum, and cold rolled steel are supplied for test by scratching, bending, etc. Roxalin Flexible Lacquer Co., Inc., Elizabeth, N. J.

The Roxalin Trail Blazer, developed by Roxalin Flexible Lacquer Co., Inc., of Elizabeth, N. J., is unique, and of real industrial importance. It demonstrates what industrial finishes are and what they will do.

The Trail Blazer is 22 feet long, elegantly equipped with exhibit of finished products which are placed in cork-lined wall panels and show cases. The displays present more than 200 parts and assembled products actually in commercial production, which have been finished with Roxalin flexible lacquer and synthetic coatings, in every conceivable style, design, color and shade, to stand every type of use and abuse, chemical and physical.

The basic materials upon which finishes are shown include metals, wood, rubber, textiles, leather and paper. The finishing problems are definitely varied; resistance to weathering, resistance to human perspiration; resistance to chemicals—acids and alkalies; resistance to abrasion, blanking and forming.

Every exhibit has a real performance story to tell showing how the above resistance characteristics preserve long finish life.

FASHIONS IN FINISHING

Ricon-trol, a texture synthetic, is portrayed as an easily controlled wrinkle finish without "fatty" edges, with fine grained texture (small craters) and great resistance to perspiration. The Carrier Corporation uses this finish on its air-conditioning units as large as 3′ 6″ by 5′ 6″ by 3′ 3″, achieving extraordinary uniformity and fineness of texture. A new style note in texture finishes is the combination Roxyn and Ricon-trol, two-coat, one-bake system put on as follows:

1. Application of Roxyn-C which air dries in lacquer time.
2. Rincon-trol coating follows immediately.
3. Only one bake for one hour at 275°F.

This combination is shown on zinc and aluminum die-castings to demonstrate the new fashions in finishing, resulting from interesting stencil applications and two-tone work done with only one bake.

The Roxalin Trail Blazer is touring the industrial centers of the United States. As an example of the interest created, one of the largest manufacturing companies in America arranged to have 42 of its executives visit the exhibit on its stop at their plant, going through in groups.

Business and Social News

BRANCH NEWS

Educational Activities

NEW HAVEN BRANCH

Five men were elected to membership at our regular meeting on June 1, 1937.

The regular business meeting was dispensed with except for the election of members. Mr. Eastman of F. B. Stevens Co. gave a talk on "New Development in Polishing and Buffing Compositions." This talk was an enlargement on an article which he has written and which wlll shortly be printed in "Metal Cleaning & Finishing" and was very interesting. Mr. Eastman would be a good speaker for other branches as his talk is quite different than most.

He covers:

1. Materials used in manufacture of composition — origin, structure, etc.
2. Making composition.
3. Testing composition in the plant.
4. How to select the right composition for a job.

About fifty men were present at the talk.

After Mr. Eastman finished, Walter Meyer spoke briefly on a number of subjects such as anodic polishing of copper, and plating and polishing abroad.

This was our last meeting until the third Tuesday in September.

CHARLES H. COSTELLO, *Sec.-Treas.*

DETROIT BRANCH

Minutes of June 4th Meeting.

The regular meeting of the American Electro-Platers' Society, Detroit Branch was held in Hotel Statler at 8 P. M., June 4, 1937. Mr. A. B. Wilson, President, presiding. Minutes of the previous meeting were read and approved.

The following applications for membership were reported on favorably by the Board of Managers and they were unanimously elected to membership:

Lyman B. Sperry, Active, 15836 Prest St., Detroit, Mich. William Thomas Kulzak, Active, 632 Harper St., Detroit, Mich. Warren H. Ebner, Associate, 16145 Sunderland Rd., Detroit, Mich. Homer Van Fossan, Active, 616 Beaubian St., Detroit, Mich. Leo Cinowa, Active, 616 Beaubien St., Detroit, Mich. Wright Wilson, Active, 19958 Keating St., Detroit, Mich.

There were no new applicants for membership presented.

A letter of resignation from Mr. D. H. Hay, Associate member, was read and accepted.

A letter from our member, Mr. R. Harr, Associate, asking for a transfer to Chicago Branch was read and it was voted that the Secretary take care of the matter.

Our President, Mr. A. B. Wilson, then gave a little talk and a sort of a verbal report for the past year and thanked all the officers and the members for their hearty cooperation and the new membership committee also came in for quite a little praise on the achievements of this Committee.

Election of officers then followed: Mr. Cherry, Mr. Schultz and Mr. Sampson were appointed tellers. There were no further nominees for the offices of President, Vice-President, Secretary-Treasurer or Librarian. It was regularly moved and seconded that the

Secretary cast a white ballot for Mr. A. B. Wilson as President, Mr. Raymond Simsick for Vice-President, Mr. T. C. Eichstaedt for Secretary-Treasurer, Mr. B. E. Lewis for Librarian.

The Board of Managers were then balloted for. Elections as follows: Mr. Charles Beaubien, Mr. James Higgins and Mr. George Kutzen were elected.

Balloting for delegates to the Convention. Mr. T. C. Eichstaedt, Mr. A. B. Wilson and Mr. James Higgins were elected.

Mr. Raymond Simsick, Mr. George Kutzen and Mr. Henry Frank were elected alternates.

The proposed amendment offered by the Boston Branch changing the membership into just two classes, active and honorary, was then taken up and discussed and the delegates were instructed to vote for this amendment at the Convention.

The amendment proposed by the Chicago Branch adding a third vice-president to the officers of the Supreme Society and inserting the word "died" regarding the replacement or appointment of officers vacated, during the year. The delegates were instructed to vote for this amendment. The amendment from the Chicago Branch regarding the vote of a delegate representing a membership of ten was also taken up and discussed and it was decided to instruct the delegates against this amendment at the Convention. The matter of Cities asking for the 1938 Convention was then taken up and discussed and the delegates were instructed to vote for any Mid-West cities who may wish to have this Convention, Milwaukee preferred. The delegates were instructed to use their best judgment at the Convention in nominating Mr. T.C. Eichstaedt for the office of the Supreme Society.

Then followed a discussion regarding our picnic for the summer. It was decided that we have a picnic. Mr. Wilson appointed Mr. George L. Nankervis as Chairman of the picnic committee. The Board of Managers constituting the rest of the Committee. This committee is going to get to work right away and, no doubt, we shall hear shortly where and when and how this picnic is going to be conducted. We are sure that with this Committee there will be a good time provided.

Then followed the installation of officers by our Mr. W.W.McCord who said quite a few complimentary things about the officers for the next ensuing year. After the installation Mr. A.B. Wilson appointed as Education Committee for the year Mr. Charles H. Eldridge. We know that Mr. Eldridge will provide speakers of note for every meeting of the coming year.

There being no further business the meeting adjourned at 10 P. M.

T. C. EICHSTAEDT, *Sec.-Treas.*

BOSTON BRANCH CHOWDER PARTY

The branch held its annual chowder supper and dance Friday May 14, at the Squantum Yacht Club, Quincy, Mass.

We had seventy-five members and their friends with the ladies. It was raining hard and this kept some away. Our President, Arthur Mintie was the chef and made the best chowder he has made in a long time. Was it hot in that kitchen? Ask Arthur, he knows. He did a fine job.

Many of our friends from out of town were with us — Bob Leather and his party—Dave Willard and his party—and by the way he was at the club first having heard that Dick Merrill had landed at the Squantum Naval Base. He rushed over there but when he got

there Merrill had taken off. They had a great time playing pool at the club.

We have been trying to find out where Charlie Hardy put all that chowder along with all the other eats. How about it Charlie?

After the supper, dancing got under way and then the fun began and kept going until midnight. Everybody had a fine time and it is hoped that we will meet you all at our annual picnic in July.

A. W. GARRETT, *Sec.*

BOSTON BRANCH

Boston Branch met Thursday, June 3 at the Manger Hotel, Boston with President Mintie in the chair.

Minutes of the previous meeting were read and approved; communications read and placed on file; bills read and moved that they be paid.

Five applications were read and approved by the board of managers and elected to membership as follows: William Irby, General Electric Co., Lynn, Mass.; William Lawson, 42 Elm St., Whitinsville, Mass.; Henry A. Perry, Jr., 1 Walnut Terrace, Newtonville, Mass.; H. James Stour, Independent Nail & Packing Co., Bridgewater, Mass., and Ernest Lawson, 15 Overlook Road, Whitinsville, Mass.

The following were elected as delegates to the convention: Bert W. Sage, Donald Wood and Andrew W. Garrett.

Officers for the following year are: President, Arthur J. Mintie, Vice-President, Edward C. DeLorme; Sec.-Treas., Andrew W. Garrett; Sergeant-at-Arms, Wallace B. Rideout; Librarian, Bert W. Sage; Board of Managers Charles O. Hardy, William A. Lawrence and Colgate Gilbert.

The committee on the chowder party made their report. A most enjoyable time was had by all present.

Charles Hardy made his final report on the chemistry class and stated that everyone that attended learned enough so that they can now take care of the solutions wherever they go. A vote of thanks was given him for his fine work.

A motion was made that the branch meet twice a month beginning next October.

A committee was appointed to make arrangements for our annual picnic and they will meet, June 10th.

After the regular order of business the chair was turned over to our librarian, Bert Sage. He introduced the speaker of the evening, Mr. William Hull of the E. I. DuPont deNemours Co. of Cleveland, Ohio.

The subject of his talk was "Science in the plating room."

All those that could not attend this meeting missed a fine talk that was of interest to all the members. He explained the surface tension meter, control of processes, pH control by the glass electrodes, throwing power and conductivity and the thickness of coatings. He showed slides of pictures of a plating room showing barrel plating handled automatically being carried out and passed through four rinse waters and hot water and then into a dryer.

His talk was one that held the interest of all the members. He answered all questions for over an hour. A vote of thanks was given Mr. Hull after which the branch adjourned until the fall.

A. W. GARRETT, *Sec.*

MILWAUKEE BRANCH

Milwaukee Branch held its regular monthly meeting June 10, 1937 and the attendance was excellent. All the old officers were present, and this being installation night the new members

were duly installed by Phil. J. Ritzenthaler.

We elected four new members into the Milwaukee Branch, Chas. L. Cope, active, of the Hamilton Mfg. Co., two Rivers, Wis., Walter R. Draeger of Racine, Wis., and two men from the Milwaukee Flush Valve Co., H. F. Thieman, and Russel C. Rothe, Clarence F. Anderson of Kenosha, Wis. applied for membership.

Milwaukee is again going to have one of its happy picnics, by the time this has been published, the picnic will be history, as we are having it June 27th, 1937 at Windlake, Edgewater Resort. More about it later.

Ray Goodsell, our new President, was appointed chairman last month of the Research committee to interest manufacturers in this district, and he reported some really amazing results. Collections were fine, and a new interest is being shown in this all important work. After all, the work done by the Research department is the yardstick and the basis for all good electroplating, and I believe, that many more of us should realize this fact, and work to interest the manufacturer of the real value of this work.

Milwaukee Branch is losing one of its younger members in that Roman Binder, our former Secretary and Treasurer is moving to Elkhart, Ind., but we hope he stays active in this branch and that we may see him occasionally.

A. J. HERMANSEN, *Sec.-Treas.*

LOS ANGELES BRANCH

Minutes of the Los Angeles Branch of the American Electro-Platers' Society regular monthly meeting held Wednesday June 9th, at the Rosslyn Hotel.

President John L. Merigold presided.

EXPERIENCED ELECTROPLATERS

prefer

ANACONDA

Copper Anodes

... because their unexcelled purity assures uniform corrosion, the highest quality deposit in the shortest possible time and low scrap losses. Furnished with suspension holes drilled as desired, or tapped for end hooks.

ANACONDA

THE AMERICAN BRASS CO.

General Offices, Waterbury, Conn.

Offices and Agencies in Principal Cities

Fifteen members and one applicant were present.

Minutes and financial reports of the previous meeting were read and accepted. The newly elected officers were installed.

Application of Mr. Erskine Raymond was read and accepted.

The application of Mr. E. R. Holman was read and turned over to the Board of Managers.

The Librarian found the following in the question box:—

Q. What makes silver solutions plate streaky?

A. Foreign matter on the surface of the work.

Q. What is the cause of silver anodes not giving off their metal?

A. Lack of cyanide or hard anodes which should be annealed.

Q. What is the effect of using Sterling Silver Anodes instead of 999 fine silver?

A. Sterling anodes dissolve less readily.

Q. What is the best way to precipitate the silver in a silver solution?

A. Add zinc turnings.

Q. What method of coloring is used to get that beautiful sheen found on high quality silverware?

A. Use lamp black and kerosene.

Q. Would like some information on bright electro pickling of steel.

A. It was suggested 1 lb. of Oxalic Acid and 2 oz. of glycerine with reverse current be tried.

The meeting adjourned at 11 P. M.

RAYMOND SOLIVAN, *Sec.-Treas.*

DAYTON BRANCH

The regular June meeting of the Dayton Branch was held Friday, June 4th at the Engineers Club with our president, Mr Conley presiding.

The minutes of the previous meeting were read and approved.

The fact was brought out that there was still several prospective new members to be contacted in Dayton and also in some of the surrounding cities. Also, that there are quite a few old members who should be reinstated and it was decided to get in touch with these men as soon as possible.

It was also decided to submit a list of delinquent members to the Board of Managers for action.

The members all expressed their satisfaction with the articles brought in by the various platers to send to the exhibit at the convention.

At this time Mr. Conley introduced Mr. Bates from the National Cash Register Company who talked on "Generators."

Although the initial cost is higher, Mr. Bates advised the slower and larger 25° rise machines for several reasons.

This machine has higher efficiency, less bearing wear, and being slower it keeps maintainence costs at a minimum.

Mr. Bates advised keeping a close watch and avoiding overloading as this decreases efficiency and increases wear. He also, advised against ball bearing machines and says constant cleanliness is necessary to get best performance from any machine.

At the close of his talk Mr. Bates answered several questions and was given a vote of thanks.

It was voted to discontinue meetings for July and August and to continue at the Engineers Club on the first Friday of the month; the next meeting being September 3rd.

CORLISS W. POWELL, *Sec.*

BRIDGEPORT BRANCH

The June meeting of the Bridgeport Branch was held in the Chamber of Commerce Rooms at the Stratfield Hotel.

Joseph Sterling, president, called the meeting to order at 8.30, there were sixteen members present. Roll Call of Officers was read, as well as the minutes of the last meeting.

Concerning the coming Convention, all delegates were fully instructed as to the Amendments to the Constitution. George Wagstaff was put in charge of exhibits that will be sent to the Penn Hotel, and Ray O'Connor is assisting him in getting these exhibits to the Convention.

One application for membership was received.

With the cooperation of the New Haven Branch, plans have been discussed for an Outing, during August or

September. A committee was appointed to work with the New Haven group, this Bridgeport Outing Committee consists of George Wagstaff, Joseph Sterling and Herman Brown.

Under the instruction of Mr. Walter Meyer, a chemistry class will be formed in the early fall, and the courses will be held at a place to be named early in September.

There will be an Old Timers Meeting at the Contract Plating Co., 540 Longbrook Ave., Stratford on July 9. During the course of the meeting a talk on "Nickel Plating Die Casting" by John Charleson of Yale & Towne will be given.

WM. FLAHERTY, *Sec.*

CHICAGO BRANCH

The regular monthly meeting of Chicago Branch was held June 5, 1937 at the Atlantic Hotel.

President G. Jelinek presided and all other officers present. A communication was read regarding the 1938 convention from the Dayton branch and referred to the delegates. A card from Milwaukee branch regarding their Annual Picnic was read which invited all the members of Chicago branch to attend. The Secretary was instructed to mail out cards notifying all Chicago Branch members, as the picnic will be held Sunday, June 27, at Fries Grove, Windlake, Wis.

Mr. H. A. Gilbertson installed the new Officers and instructed each in the duties of his office.

Mr. F. J. Hanlon made a very fine and complete report of the plating experiences of Mr. O. E. Servis to whom this meeting was dedicated. Oscar as we all know him has been in the various offices of the Chicago Branch and the National Society for the past 25 years and has given freely of his time and knowledge. He received a standing vote of thanks for these many years of services. Mr. Hanlon then gave a brief outline of the Chicago branch history from the time it started till the present time naming many of the gentlemen that have passed on, but who due to the many educational features offered by them to the A.E.S. are loved and respected by all the members. Mr. Hanlon with the aid of Mr. M. H. Longfield at the lantern showed a few slides of the interesting subjects and work of the late Fred Liscomb. Mr. Hanlon made his talk so interesting that it was just like reading a very fine book and was enjoyed by all.

Mr. V. Mattacotti of the Hanson VanWinkle Munning Co. made a very interesting talk on Bright Nickel Solution and answered the many questions put to him in a way that proved that he knew his subject.

The following applications were read and committees appointed on same: L. Keiser, O.Kocour, A. J. Lemrise, J. Cerceo, P. Springer, O. Henninger, and L. R. Bartnek.

There were about 140 members present and many of these were the oldest members in Chicago Branch and it was a pleasure to see them all again. As the hour was getting late and there was entertainment, lunch and refreshments

USED BUFFS FOR SALE

64-68—1⅛" arbor—20 ply

Full Disc - Loose - or Sewed

Thousands of every size

8"—8¢ each 9"—9¢ each

10"—12¢ each

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to follow it was decided to omit the question box for this meeting.

J. W. HANLON, *Sec.*

GRAND RAPIDS BRANCH

Grand Rapids Branch held its regular meeting Thursday, June tenth. The meeting was called to order by President Morton with all officers present.

The applications of the following were reported on formally by the board of managers and they were elected as follows:

Mr. Cornelius G. Schreur, Mr. Maurice R. Caldwell.

Mr. Chas. O. Werft, acting librarian, placed on the blackboard a number of questions which were given him during his course of travel and general discussion followed.

Before adjournment the members were reminded of the open meeting to be held in October at Kalamazoo with our good friend, Joe Nook.

CHAS. S. WHALLEY, *Sec-Treas.*

ANDERSON BRANCH

Anderson Branch met for a business meeting June 21, 1937 at the Y.M.C.A. with President George Onksen in the chair.

Minutes of the last meeting were read and approved. The roll call of officers showed all present except Librarian, Bob Wagner who is on a vacation trip.

The retiring Treasurer's report was read and approved. Our financial condition is good. The Treasurer also reported on our banquet held May 22. It was gratifying to hear that it was a financial success as well as a social and educational success. About one hundred and fifty members and guests heard a very interesting program headed by Mr. Philips of General Motors, Dr. Mathers of Indiana University and Judge Woeste of Cincinnati.

A motion was carried to exempt the President, Secretary, Treasurer and Librarian from payment of dues during the tenure of their office.

Felix Cassidy and Earl McGuire were voted suspended for non-payment of dues.

The Branch voted to reinstate Jess Wilson as an active member upon his compliance with the requirements.

The meeting was then turned over to William Castell who gave an interesting report on the convention papers and business meeting.

Meeting adjourned at 9:30 P. M.

L. R. HINSCH, *Sec.*

NEWARK BRANCH

The regular meeting of the Newark Branch was held on Friday evening, June 4, 1937 at the Krueger Club, Belmont and Springfield Aves., Newark, N. J.

The meeting was called to order at 8:30 P. M. with all officers present.

An application for Mr. James F. O'Brien to active membership was voted to take the regular course.

The installation of the newly elected officers was then conducted by Mr. Thomas Haddow in a very appropriate manner. The officers installed are as follows: George Klink, President; William Hodecker, Vice-President; George Wagner, Secretary; Nelson Sievering, Treasurer; Paul Oldam, Librarian; Roy Stout, Sarg-at-arms; Samuel Taylor, Samuel Glickenhaus and Thomas Haddow, Trustees.

After being handed the gavel, Mr. George Klink conducted the meeting for the balance of the evening. Mr. Horace Smith and Mr. George Wagner made a report as to their investigation of the Convention Hall and the Berkley Cartaret Hotel at Asbury Park, N. J. This report was received with

great enthusiasm by the 32 members who attended the meeting and upon motion duly made and seconded it was passed that the 1939 Convention should be held at Asbury Park if Newark should succeed in their objective.

Mr. Paul Oldam, our Librarian, called on Mr. Klinkenstein for some remarks on Lacquers for Color Retention on gold plated articles. Mr. Klinkenstein pointed out very clearly that thin coatings of lacquer are recommended wherever the color of the metal lacquered is to be considered. He also recommended air drying lacquers for that purpose, stating that heat would have a tendency to change the color to some extent.

Mr. Oldam then called on Mr. Cinamon, a member of N. Y. Branch, who spoke on the "Metalizing Process," in which metal is sprayed with an Acetylene Torch. He stated that he had seen some work done in this process on very large articles such as heavy presses, shaftings, etc., but he stated that this process would not, for at least some time to come, replace Electro Plating, in-as-much as the process in itself is very expensive and the finish not near as satisfactory as Electro Plating.

Meeting adjourned 10:30 P. M. and was followed with refreshments.

GEORGE WAGNER, *Sec.*

NEWARK BRANCH

The regular meeting of the Newark Branch, A. E. S. was held on Friday evening, June 18, '37 at the Krueger Club, Belmont and Springfield Aves., Newark, N. J.

The meeting was called to order at 9 P. M. with President George Klink presiding. The following officers were present: George Klink, President; William Hodecker, Sr., Vice-President; George Wagner, Secretary; Nelson Sievering, Treasurer and Paul Oldam, Librarian.

The minutes of the previous meeting were read and approved.

An application for Mr. Stephen Leshnick to active Membership was voted to take the regular course.

Mr. John L. DeVries, 525 Kingsland Rd., Nutley was elected to Associate Membership.

Mr. Julius Silenick, 603 Court Street, Elizabeth, N. J., was elected to Active Membership.

Mr. Henry Neurenberg, Pyrene Mfg. Co., 360 Belmont Ave., Newark, N. J. was elected to Associate Membership.

Mr. Nelson Sievering and Mr. George Wagner made a report on the Convention and outlined in detail the activities of each day. What interested the members most was the fact that Newark Branch was awarded

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the honors of acting as host at the 1939 Convention to be held at Asbury Park, N. J.

Mr. Oldam, our Librarian, informed us that he was endeavoring to arrange for a meeting in Newark of all the Librarians in the East for the purpose of discussing matters of most interest to the platers, also about selecting speakers for the regular meetings.

Mr. George Wagner was appointed Chairman of the Fishing Trip Committee. This trip will be held some time in August, the exact date to be announced later.

The Branch decided to have one meeting a month on the third Friday during July and August.

Meeting adjourned 11 P. M.

GEORGE WAGNER, *Sec.*

HARTFORD BRANCH

The Hartford Branch of the A. E. S. held its regular monthly meeting on Monday evening, June 21, 1937, at the Elk's Club, Bristol, Conn.

The meeting was called to order at 8:15 with President Pietro in the chair. Minutes of the previous meeting were read and accepted. No communications or bills were presented.

At this meeting, our National Convention delegates reports were given. They should be complimented for the way in which the reports were given. From their reports, it is very evident that the Convention was a huge success.

At the conclusion of the regular business meeting, the members were pleasantly surprised by a very tasty luncheon which was given them by Mr. Apley N. Austin, Associate member of the Hartford Branch. Many thanks to Apley for his thoughtfulness and generosity.

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Plans for an annual outing were discussed, but no definite plans were made.

The meeting was attended by fourteen members and was adjourned at 11:00 P. M.

V. E. GRANT, *Sec.*

WATERBURY BRANCH

The June meeting of Waterbury Branch, A. E. S. was held Friday the 11th, in Engineers Hall. President Tennant Elwin presided. Final communication from New York Branch relative to the Silver Jubilee Convention was read. A general discussion in matters that were expected to come up at the Convention, took place. A communication from the Dayton Branch relative to its bid for the 1938 Convention was read. Favorable action having been taken in the applications of James Guffie, Winsted Aluminum Corp., Maurice Henry, Oakville Pin Co., and Dante Cantamessa, Waterbury Button Co., they were declared elected to membership. Application of Patrick Vitello, 85 Harpers Ferry Road, employed by Lux Clock Co., for associate membership, was ordered to take the usual course. The final Branch reading of the paper presented by Waterbury Branch, "The

Barrel Rolling of Metal Parts," was given by William J. Gray, who also read it at the New York Convention. It was noted at the meeting, that commencing with the September meeting, the Branch changes its place of meeting from Engineers Hall to the Hotel Elton. Waterbury Branch was certainly well represented at the recent Convention, and in almost any place, or at any time in the Hotel Pennsylvania, where convention matters were discussed, groups of Waterberians could be seen indulging in same. Amongst the members of the Branch observed were, William J. Gray, Joseph McConas, Archie MacDermid, Joseph Muscio, Sept. Marland, Benjamin McGar, Richard Crane, Henry Mahlstedt, Ralph Brandeley, William Coleman, Louis Lougee, Ellsworth Candee, Ralph Lee, Tennant Elwin, George Dubpernell, George Muscio, LeVerne Verzier, J. Stark and William Guilfoile. There may have been others, and probably were. This gathering, many of whom brought along their wives and friends, together with others interested in the Convention, brought Waterbury's total in attendance at the Convention up around the forty mark.

WM. GUILFOILE, *Sec.*

MILWAUKEE BRANCH

Milwaukee held its annual picnic recently at Windlake and about 500 members, guests and children attended. We take this opportunity to thank the weather man for the ideal day he provided. At noon the hungry folk partook of their dinners, and shortly thereafter the games were run. The A. E. S. does not boast of any "Jesse Owens," so the races were short in length, but Boy how fast!

The single boys won the ball game, 20 to 3, the married gentlemen, were no match for the masterful pitching served up to them. It has been suggested that the married men hire an umpire for the next annual session.

The Milwaukee branch was greatly surprised at the number of folk who came from quite some distance to attend our picnic. The many supply houses in this section supplied us with ample and worthwhile prizes and only a few families went home with less than they arrived. All in all we believe that we had a successful gathering, and we want to thank the committee for their endeavors.

A. J. HERMANSEN, *Sec-Treas.*

BINGHAMTON-ELMIRA BRANCH

The regular meetings of Binghamton-Elmira Branch have been discontinued until September.

A meeting of officers was held at the home of the Secretary, Sunday, June 27 to arrange for our meetings next fall and winter. At this time Delegate Fletcher reported at length on the convention. Evidently the Boston amendment to change the class of membership doesn't set right with Fletcher.

He says "The A. E. S. is a FOREMAN PLATERS organization and that he as a member of the younger generation of foreman platers will do everything in his power to see that the Society continues to be run by foreman platers."

"They want to open the doors—fine, open them wide bring anyone in so long as he is interested in plating, but continue to have the same requirements to become an active member."

"I cannot understand how a branch of foreman platers will vote away the only chance in the world they have of

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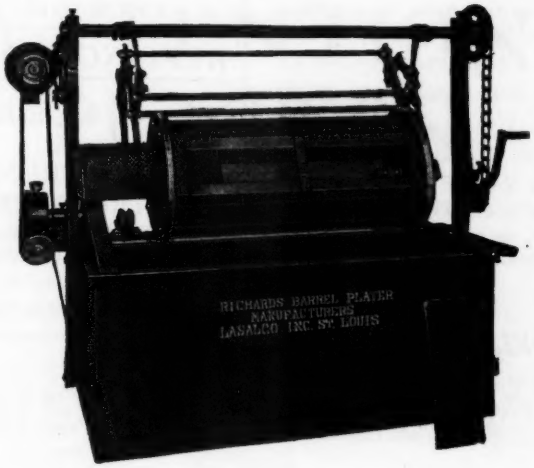

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feeling a bit important by being elected to an office in the A. E. S." "Who, and what is in back of it all?

"Remember boys it is pretty strong —if it ever goes through we are all washed up. We are on the spot—behind the 8 Ball." "Get Busy."

Secretaries Note: The above report expresses the sentiments of our delegate and not necessarily of Binghamton-Elmira Branch at this time.

A. FLETCHER, *Sec.*

PHILADELPHIA BRANCH

Philadelphia Branch meeting called to order by Pres. A. Hirsch. Roll Call of officers — all present but G. Gehling and P. Uhl.

Application of Mr. Henry G. Orilili approved by the Board of Managers. Moved and seconded, Mr. H. G. Orilili be elected an Associate member of Phildelphia Branch, carried.

Report of Sec-Treas. read and moved and seconded report be received and spread on the minutes, carried. Report of Auditing Committee read; moved and seconded same be received and spread on the minutes and committee be discharged with thanks carried.

The delegates gave a brief report on the proceedings of the Jubilee Convention of the Supreme Society, held at New York which was the most successful both educational and in attendance. The Fellowship Club should be complimented on their splendid cooperation in the many courtesies and entertainment of the delegates and members at the convention. Also New York Branch should be complimented on the able and business-like manner in which they managed the Supreme Society Convention.

The next convention will be held at Milwaukee, Wis., also the convention of the year 1939, will be held at Newark, and this is to be an International Convention.

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GOOD WORK PROMPT SERVICE

Mr. G. Long, Past President of Philadelphia branch installed the following officers and instructed them in their duties: Pres. Joe E. Underwood; Vice President, Fred Fulforth; Sec-Treas., Robert E. Jackson, Jr.; Librarian, John L. Nelson; Board of Managers, George Gehling, Harry Snyder, Harry Kellar.

Moved and seconded Past President G. Long be given a rising vote of thanks for the able manner in conducting the installation carried.

Pres. Joe. E. Underwood reported to the branch that there had been a meeting of the newly elected officers and at that time they outlined the following activities for the ensuing year. The upstate meeting to be held in Reading in September; the October meeting in reference to the research committee, in the progress being made in their work and the Yearly Meeting and Banquet to be held in November.

Moved and seconded the branch concur or affirm the actions of the Pres. carried. The following were appointed on the committees. Reading meeting, J. E. Underwood, F. Fulforth, G. Gehling, A. M. Robson, J. L. Nelson, A. Hirsch and R. E. Jackson, Jr. October

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METEX No. 1-W Metal Cleaner

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LONG LIFE — QUICK DETERGENT ACTION

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Long considered the standard all-around platers' cleaner — now even better, due to improved ingredients and scientific manufacturing methods.

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WATERBURY, CONN.

meeting A. Hirsch. Yearly meeting and Banquet, Nat Verrelle, Educational Committee, J. L. Nelson and F. Fulforth.

Editor Quaker City Reminder moved and seconded the regional research committee appointed, at the May meeting be reappointed carried.

There being no further business, meeting adjourned until Sept. 1937.

ROBERT E. JACKSON, JR., *Sec.*

CLEVELAND BRANCH

Meeting of the Cleveland Branch was called to order by Pres. Scott at 8.15 o'clock June 5th, the attendance was fine.

The minutes of the previous meeting were read and approved.

Delegates to the New York convention were to vote as they see fit. Mr. Carlson was asked to read the Branch paper on "Health Hazard in Plating Industry", he did a good job of it so he was elected to read it at the convention.

Secretary ordered to notify members there will be no July meeting. The Picnic was discussed and it will be held July 24th, 1937 at Sunny Brook Gardens, dinner and refreshments will be served. Baseball and horseshoe games will be played, the Committee for the Picnic are Mr. Singlar, Mr. O'Berg, Mr. Weber.

Meeting adjourned at 10.30 o'clock.

CHARLES F. OTT, *Sec.-Treas.*

DETROIT BRANCH

There will be no meetings held here until September 10th, 2nd Friday of the month. Thereafter regular monthly meetings will be held the first Friday of each month.

Detroit Branch will have a Picnic on Saturday, August 7th. It will be held at "Sandy Mac's" Golf Course, 8415 Tireman Dearborn, Michigan which is really in "*Detroit*", the same place as it was held last year. All arrangements have been made for a good time, and we invite every one who can, to attend this picnic. There will be a small fee charged which has not yet been decided upon definitely, but it will not be more than 75c per head. This fee will entitle one to all they care to eat and drink, the use of the Golf Course and entry into all of the Games and Races, for which elegant prizes have been donated by the local Manufacturing and Supply houses.

Detroit Branch is looking forward to a goodly crowd in attendance and we wish to extend our invitation to any and all out of town members and friends of the A.E.S., who are or contemplate visiting Detroit at that time to attend this Outing. They will have a good time.

T. C. EICHSTAEDT, *Sec.*

Obituary

We have been informed by Mr. Charles F. Ott, Secretary of Cleveland Branch that Mr. Henry Ter Doest, charter member of that Branch was killed in an auto accident July 4. For many years Mr. Ter Doest was active in the affairs of the A.E.S. and until recent years was a familiar figure at the National Conventions.

We express our sympathy to the members of the family in their time of trouble and to Cleveland branch in the loss of a loyal and enthusiastic member.

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A product summary giving the properties of this cellulose type, air-drying, flexible lacquer enamel for low cost finishing. Samples on brass are supplied for testing by scratching, bending, etc. Roxalin Flexible Lacquer Co., Inc., Elizabeth, N. J.

CREDIT MEN ELECT PAUL FIELDEN

The new president of the National Association of Credit Men, elected at the annual convention in Chicago, June 21 to 24, is Paul Fielden of the Norton Company, Worcester, Massachusetts. Mr. Fielden has been in close touch with the affairs of the National Association, having been a director in 1934 and vice president in 1935.

As a credit man, Mr. Fielden has had a broad experience, having been engaged in credit work with the Norton Company for 17 years, 10 years as Assistant Credit Manager and seven years as Credit Manager. The company with which he is connected manufactures grinding wheels, pulpstones, and a variety of abrasive products, grinding machinery, refractory ware and non-slip tile, and as a consequence Mr. Fielden contacts about every type of industry. Norton Company is the largest manufacturer of abrasive products in the world with branch factories located in England, France, Germany, Italy and Canada and sales contacts in every industrial center of the world.

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Membership Campaign

July 1, 1937

Branch	Elected	Reinstated
Boston	5	
Milwaukee	5	
New York	5	
Newark	5	
Toledo	3	
Waterbury	3	
Bridgeport	2	
Toronto	2	
Binghamton-Elmira	1	
Los Angeles	1	
Philadelphia	1	
Chicago		1
Detroit		1
Anderson		
Baltimore-Washington		
Cincinnati		
Cleveland		
Dayton		
Grand Rapids		
Hartford		
Montreal		
New Haven		
Pittsburgh		
Providence-Attleboro		
Rochester		
San Francisco		
Springfield		
St. Louis		

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Membership Report

To July 1, 1937

ELECTIONS

Henry G. Orlick, 1256 Liberty St., Camden, N. J.
Associate, Philadelphia Branch

Paul J. Hart, Yerges Mfg. Co., Freemont, Ohio
Associate, Toledo Branch

Ernest Lawson, 15 Overlook Rd., Whitinsville, Mass.
Active, Boston Branch

H. James Stour, Ind. Nail & Packing Co., Bridgewater, Mass.
Associate, Boston Branch

Henry A. Perry, Jr., 1 Walnut Terrace, Newtonville, Mass
Associate, Boston Branch

William Lawson, 42 Elm St., Whitinsville, Mass.
Active, Boston Branch

William Irby, General Electric Co., Riverworks, Lynn, Mass.
Associate, Boston Branch

Loren E. Raymond, 1447 Nand, Los Angeles, Cal.
Associate, Los Angeles Branch

Russell C. Rothe, 1922 No. Palmer St., Milwaukee Branch
Associate, Milwaukee Branch

Chas. L. Cope, 1613 Washington St., Two Rivers, Wis.
Active, Milwaukee Branch

Walter R. Draeger, 1637 Goold St., Racine, Wis.
Active, Milwaukee Branch

Herbert F. Thieman, 3160 So. 9th Pl., Milwaukee, Wis.
Associate, Milwaukee Branch

Dante Cantamessa, P. O. Box 569, Waterbury, Conn.
Associate, Waterbury Branch

Maurice Henry, Oakville Pin Co., Oakville, Conn.
Associate, Waterbury Branch

James Guffie, 29 Coe St., Waterbury, Conn.
Associate, Waterbury Branch

Clarence F. Anderson, c/o Specialty Brass Co., Kenosha, Wis.
Active, Milwaukee Branch

Lester W. Kreilick, Yerges Mfg. Co., Freemont, Ohio
Associate, Toledo Branch

Herbert R. Taylor, Yerges Mfg. Co., Freemont, Ohio
Associate, Toledo Branch

T. Bailey Curran, Remington Arms Co., Bridgeport, Conn.
Associate, Bridgeport Branch

Carl Schaefer, 48 Putnam Ave., So. Norwalk, Conn.
Associate, Bridgeport Branch

John L. DeVries, 525 Kingsland Rd., Nutley, N. J.
Associate, Newark Branch